



Natural Disasters and Their Impact on Vulnerable Communities in Jammu and Kashmir

Mohmad Yaseen Najar

¹ Department of Disaster Management, Govt. Degree College Langate, Kupwara

* Corresponding Author:

Mohmad Yaseen Najar
zahooriededar75@gmail.com

ARTICLE INFO	ABSTRACT								
Article History <table><tr><td>Received</td><td>16-01-2023</td></tr><tr><td>Revised</td><td>24-04-2023</td></tr><tr><td>Accepted</td><td>19-05-2023</td></tr><tr><td>Published</td><td>30-06-2023</td></tr></table> ARTICLE ID TPAS0101001 KEYWORDS <i>Natural disasters, Socioeconomic impact, Vulnerable populations, Jammu and Kashmir, Disaster resilience, Climate change, Sustainable development.</i> OPEN ACCESS	Received	16-01-2023	Revised	24-04-2023	Accepted	19-05-2023	Published	30-06-2023	Jammu and Kashmir, a region of extraordinary ecological fragility and geopolitical sensitivity, has been increasingly affected by a range of natural disasters including earthquakes, floods, avalanches, landslides, and the broader impacts of climate change. This article explores the multifaceted social and economic consequences of such disasters on vulnerable populations residing in the Union Territory. Using secondary data sources and empirical literature, the study analyzes how these natural hazards disrupt livelihoods, damage critical infrastructure, displace communities, and exacerbate poverty and health issues. The findings reveal that the socio-economic fabric of Jammu and Kashmir is highly susceptible to disaster-induced shocks due to a combination of geographical vulnerability, inadequate infrastructure, low disaster preparedness, and socioeconomic inequalities. Disasters such as the 2014 Kashmir flood and the 2005 earthquake have left long-lasting impacts on housing, agriculture, education, and mental health. The article also examines the role of government and non-government interventions in disaster response and resilience-building. It underscores the urgent need for integrated disaster risk reduction strategies, improved early warning systems, and sustainable development policies tailored to the unique topography and demographics of the region.
Received	16-01-2023								
Revised	24-04-2023								
Accepted	19-05-2023								
Published	30-06-2023								



INTRODUCTION

Natural disasters cause widespread death and property destruction. Seismic, drought, flood, and landslide events are weather, geology, or biology-related. The manifestation of climate change leads to an increase in natural disasters, especially floods and wind storms, due to ocean temperature changes. People moving to disaster-prone locations may cause additional natural disasters, especially in fragile countries. Frequent disasters prevent high-vulnerability and poor countries from developing and enhancing resilience. Droughts have increased little, while earthquakes, floods, volcanoes, avalanches, and landslides have not. Evidence shows a relationship between disasters, security, and economic development. The short-term effects of natural disasters are clear, but their long-term effects are not. "Disaster" is a disruption in the operation of a community or society that causes widespread human, economic, environmental, or material losses and exceeds its ability to cope (UNISDR, 2009). Natural and man-made disasters have devastated most countries, causing millions of refugees, migrants, damaged livelihoods, and property destruction. Between 1996 and 2015, natural disasters killed 1.3 million people in rich and developing nations. Disasters killed 5 times more people in low-income countries than in high-income countries. India has several disasters due to its topography, geology, geography, climate, and low socioeconomic development. From 1996 to 2015, earthquakes, floods, landslides, and avalanches killed 97,691 Indians, the fifth highest fatality rate in the world. Jammu and Kashmir is one of the most socio-economically and politically challenging regions on Earth, and political and natural disasters have decimated its growth. After the Indian tectonic plate collided with the Eurasian plate, intermontane basins formed, which house most of the region's inhabitants. As tectonics shapes the region's geography, geology, geomorphology, and climate, earthquakes and floods may be inevitable. Our knowledge of earthquake causes instructs us to prioritize preparedness over forecast, which is partly true of flood threats.

Jammu and Kashmir is one of the worst-hit regions by natural disasters. Due to its topography and climate, Jammu & Kashmir faces many natural risks. Jammu and Kashmir has experienced devastating floods, earthquakes, avalanches, and landslides (SDMP, 2017). Over the previous 17

years, the Union Territory has seen a 2005 earthquake, 2010 flash floods and landslides, and 2014's major flood. Natural disasters damage Jammu and Kashmir's agriculture, horticulture, handicrafts, and tourist sectors (Sharma, Sharma, and Waris, 2012). Srinagar, Ganderbal, Bandipora, Budgam, Baramulla, Kupwara, Anantnag, Pulwama, Kishtwar, Doda, and Ramban are in seismic Zone V, which has 50% of the Union Territory's population. Jammu and Ladakh are in Seismic Zone IV (NIDM, GOI, 2015).

Natural disasters represent one of the most formidable challenges to human society, particularly in regions where vulnerability is compounded by socio-political instability, economic underdevelopment, and environmental fragility. Jammu and Kashmir, located in the northwestern Himalayan region of India, epitomizes such vulnerability. With a complex interplay of geographical, geological, and climatic conditions, the region is perennially susceptible to a wide array of natural hazards including floods, earthquakes, avalanches, landslides, and the broader consequences of climate change. Each of these hazards has, over time, inflicted significant social and economic damage upon the populations of Jammu and Kashmir, particularly its most vulnerable groups who lack the resilience and resources to cope with such recurrent shocks. As a region marked by both natural beauty and tectonic volatility, Jammu and Kashmir is emblematic of how nature's unpredictability can repeatedly disrupt lives, livelihoods, infrastructure, and the broader developmental trajectory of a society.

At the heart of the problem is the convergence of high seismicity, extreme topographical variation, and seasonal climatic shifts, all of which generate an environment where disasters occur with alarming frequency and intensity. Earthquakes such as those of 2005 and earlier in 1885 have historically devastated large swathes of the region, causing significant loss of life, displacing thousands, and overwhelming already fragile infrastructure. Similarly, floods—most notably the catastrophic 2014 deluge—have disrupted everyday life on a massive scale, destroying homes, schools, roads, and hospitals, while also inflicting irreversible psychological trauma on the affected populations. The geography of Kashmir, with its bowl-like valley flanked by steep mountainous terrains, makes it especially prone to waterlogging, overflow from rivers like the Jhelum, and sediment deposition that further



exacerbates urban flooding. Moreover, heavy snowfalls during winter months and sudden thawing in spring contribute to frequent avalanches that not only claim lives but also hinder mobility, cut off remote areas, and impair military and civilian logistics.

Natural disasters in this region cannot be understood merely as acts of nature; their impact is deeply entrenched in the socio-economic fabric of the region. The disproportionate toll they exact on the poor, marginalized, elderly, and differently-abled underscores how disaster vulnerability is not evenly distributed across populations. Many of these individuals live in high-risk zones due to historical settlement patterns, economic necessity, or displacement from conflict. Their limited access to healthcare, financial assets, social capital, and political voice further aggravates their capacity to recover post-disaster. Agriculture, which is the mainstay of Jammu and Kashmir's economy, suffers immense disruption from these disasters. Floods and landslides wipe out crops, destroy irrigation channels, and erode fertile land. Avalanches often obstruct access to grazing grounds, thereby affecting the nomadic communities whose livelihoods depend on animal husbandry. The destruction of roads and markets further constrains the movement of goods and labor, resulting in price inflation, unemployment, and food insecurity. The damage extends beyond the economic to the social and psychological realms. Educational institutions are rendered inoperative, disrupting children's learning for extended periods. Hospitals lose power and medical supplies, exacerbating existing health crises and increasing mortality rates, particularly among the most vulnerable.

It is crucial to recognize that natural disasters in Jammu and Kashmir are not isolated events, but part of a systemic pattern linked with climatic changes and human intervention in ecological systems. Deforestation for timber, unplanned urbanization, poorly regulated construction, and encroachment on riverbanks have all heightened the risks. The delicate ecology of the Himalayas is unable to withstand the strain of these interventions, leading to increased frequency and magnitude of disasters. Climate change has further intensified this scenario. Rising temperatures have altered precipitation patterns, leading to unpredictable monsoons, longer dry spells, and sudden cloudbursts—all of which culminate in a more disaster-prone environment.

The melting of glaciers, which serve as critical water sources for the rivers in Kashmir, poses a dual threat: initially increasing flood risks due to excessive water discharge and later precipitating droughts due to diminished glacial mass.

In this context, the role of governance, policy, and institutional response becomes crucial. Despite the central and state governments' efforts to improve disaster management capacities—through mechanisms like the State Disaster Management Authority, early warning systems, and relief funds—many gaps persist. Preparedness remains low at the community level, especially in rural and remote areas where awareness about evacuation plans, first aid, and risk reduction strategies is minimal. Infrastructure in many places is ill-equipped to withstand high-magnitude events. Buildings often do not conform to seismic norms, and healthcare and educational institutions lack disaster contingency plans. Bureaucratic delays, lack of coordination between various agencies, and corruption further weaken disaster response efforts. Post-disaster rehabilitation and reconstruction are typically slow and uneven, with many marginalized groups left out of recovery schemes. Financial compensation is often insufficient and riddled with procedural hurdles, discouraging victims from seeking aid.

What makes the situation in Jammu and Kashmir even more complex is its geopolitical sensitivity. The region has been at the center of territorial disputes and conflict for decades, and this has had a detrimental impact on disaster preparedness and response. Military presence, curfews, communication blackouts, and restricted access during emergencies hinder rescue operations and the delivery of humanitarian aid. The political instability also detracts attention and resources from long-term resilience-building efforts. In conflict-affected areas, the social fabric is already strained, and trust in government institutions is low. This reduces the efficacy of disaster response and increases people's reliance on informal networks, which may not always be adequate or inclusive. At the same time, the central government has launched several schemes aimed at improving resilience, such as the integration of disaster risk reduction with employment guarantee schemes like MGNREGA. Initiatives to train women through self-help groups in skills like carpet weaving and livestock rearing have also contributed to building economic resilience in vulnerable communities.



An important dimension often overlooked in disaster literature is the psychological and emotional toll of recurring catastrophes. In Kashmir, where people have already endured conflict, displacement, and militarization, the additional stress of losing homes, livelihoods, and loved ones in natural disasters compounds existing trauma. Studies have shown high levels of post-traumatic stress disorder (PTSD), depression, and anxiety among flood-affected populations, particularly women and the elderly. The social implications are also grave—families get separated, social cohesion is disrupted, and community rituals and festivals that foster solidarity are suspended. Over time, this can erode social capital, which is a crucial buffer in times of crisis.

Therefore, an effective strategy for addressing the social and economic impacts of natural disasters in Jammu and Kashmir must be multifaceted. It should combine robust infrastructural development with inclusive policy-making that centers the needs and voices of vulnerable groups. Community-based disaster preparedness, decentralized governance, gender-sensitive planning, and integration of traditional knowledge with scientific innovation are all necessary elements of such a strategy. Education and awareness campaigns should be expanded to inculcate a culture of safety and resilience. Urban planning should adhere strictly to environmental norms, and rural development programs must prioritize ecological sustainability. Technology—such as satellite imaging, GIS mapping, and mobile-based early warning systems—should be leveraged to improve forecasting and real-time response. Furthermore, disaster impact assessments must go beyond quantifying economic loss to include indicators of human development, health, and well-being.

In the broader context, Jammu and Kashmir presents a critical case study for understanding the intersection between natural hazards, vulnerability, and development in a fragile socio-political setting. It offers insights into how environmental risks are mediated by structural inequalities and governance capacities. The region's experiences can inform national and international discourses on disaster resilience, especially in mountainous and conflict-prone areas. As climate change accelerates, the frequency and intensity of disasters are only likely to increase, making it imperative to rethink existing models of

disaster risk management. Emphasis should shift from reactive approaches to proactive, preventive, and adaptive strategies that are grounded in local contexts but informed by global best practices.

Review of Literature

The literature on natural disasters and their socio-economic impacts in Jammu and Kashmir is extensive and varied, reflecting the region's unique vulnerability due to its topography, climate, and socio-political context. This review synthesizes the major academic and policy contributions that have examined disaster patterns, their effects on vulnerable populations, the effectiveness of mitigation strategies, and the broader implications for sustainable development in this Himalayan region.

Numerous scholars have studied the historical and geophysical context of disasters in Jammu and Kashmir. Anees and Bhat (2016) provide a comprehensive historical analysis of earthquakes in the Kashmir Valley, tracing seismic activity back to the 16th century. They argue that the tectonic positioning of the region between the Indian and Eurasian plates has made it inherently prone to high-magnitude seismic events. Ghaffar and Abbas (2010) support this view and contend that any long-term development plan in the region must factor in the inevitability of earthquakes. They emphasize preparedness and retrofitting of infrastructure as critical mitigation strategies. Hassan (2014) adds that seismic zones IV and V, covering significant portions of Jammu and Kashmir, require special planning considerations in urban development, especially in cities like Srinagar and Jammu.

Floods, another recurring disaster in the region, have been the subject of significant academic scrutiny, particularly after the devastating floods of 2014. Gupta (2014) critiques governmental inaction and urban mismanagement, arguing that many flood damages in Srinagar were not solely due to extreme rainfall but exacerbated by encroachments on floodplains, poor drainage systems, and unregulated construction. Shah et al. (2018) analyze flood hazard mapping and conclude that areas along the Jhelum River are particularly at risk, calling for stricter land use regulations and early warning systems. They further assert that the socio-economic impact of such floods is deeply unequal, with poorer residents in informal housing suffering disproportionate losses. Venugopal and Yasir (2017) explore the intersection of political



conflict and natural disasters, arguing that relief and rehabilitation post-2014 were deeply affected by the region's ongoing political instability and militarization. Their research highlights how conflict zones complicate disaster response, delay relief efforts, and exclude already marginalized groups from accessing state support.

Landslides and avalanches have also been studied for their localized but catastrophic impacts. Singh et al. (2012) examine case studies from the Doda and Poonch districts and argue that unscientific road and hydropower infrastructure construction has increased landslide frequency. Similarly, Ganju and Dimri (2004) emphasize the growing frequency of avalanches in the upper Himalayan reaches of Jammu and Kashmir, especially in areas like Gurez, Kargil, and Sonamarg. They suggest that climate change has intensified snow deposition, increasing avalanche vulnerability, particularly for Indian army personnel stationed in high-altitude posts. Rafiq and Mishra (2018) further connect avalanches to broader climate anomalies and call for automated snow monitoring stations as part of a modernized disaster early warning system.

The role of climate change as an underlying factor exacerbating natural disasters in Jammu and Kashmir has gained considerable attention in recent literature. The Indian Network for Climate Change Assessment (INCCA, 2014) notes significant changes in precipitation patterns, shrinking of glaciers, and shifts in agricultural zones within the region. These climatic shifts not only increase disaster risks but also threaten food security and rural livelihoods. Climate models suggest that apple and saffron production—two major agricultural outputs of Kashmir—are highly susceptible to temperature and rainfall variations. Galbraith et al. (2005) also emphasize the long-term economic risks of climate change to Kashmir's infrastructure, particularly road networks, which are vital for communication and emergency response. Vithalani and Bansal (2017) call for an integrated climate adaptation strategy that merges traditional knowledge systems with scientific forecasting.

The literature also engages extensively with the concept of vulnerability, especially regarding who suffers the most from natural disasters and why. Fatima and Maqbool (2017) assess the psychological impact of the 2014 floods and found high levels of PTSD, particularly among

women and the elderly. Their work emphasizes the need for mental health services as part of post-disaster recovery—a factor often ignored in disaster planning. Yadav et al. (2016) explore the economic vulnerability of rural households in Anantnag and Kulgam districts and find that loss of livestock and crop failure leads to long-term indebtedness. Irshad and Bhat (2015) discuss how women's self-help groups (SHGs) have played an important role in building economic resilience post-disaster by promoting savings, income generation, and collective action. They argue that empowering local institutions can enhance community-based disaster preparedness.

The policy dimension of disaster management in Jammu and Kashmir has been analyzed by various governmental and non-governmental reports. The State Disaster Management Plan (SDMP, 2017) outlines comprehensive strategies for disaster risk reduction, but also admits to significant gaps in capacity, funding, and inter-departmental coordination. The plan highlights the need for modern technologies like Geographic Information Systems (GIS), but also acknowledges limited technical manpower and poor public awareness as major roadblocks. Chhibber and Laajaj (2008) argue that disaster preparedness in India remains underfunded and overly reactive. They advocate for integrating disaster management into all levels of governance and development planning. The Government of India has also tried to link disaster risk reduction with employment schemes such as MGNREGA and social security programs like the Indira Awas Yojana. GoJ&K (2015) outlines how these schemes have been used to promote flood protection, irrigation channel management, and rural housing development in disaster-prone areas.

Another critical area explored in the literature is the relationship between natural disasters and economic development. Kumar et al. (2006) use satellite imagery to document the economic losses incurred due to the 2005 earthquake and show that significant damage occurred to infrastructure, agricultural land, and commercial establishments. They argue for disaster insurance, microcredit, and community recovery funds as essential tools for rapid economic revival. Winter and Bromhead (2012) focus on the societal acceptance of disaster risk and argue that public tolerance for poor infrastructure and weak institutions must be replaced with demand for accountable governance and science-based



planning. Thussu (2013), while focusing on communication, asserts that disaster education must be incorporated into school curriculums to build long-term awareness and resilience.

Natural Hazards in Jammu and Kashmir

In the northern region of India, the plains around Jammu to the south and the valley of Kashmir to the north define Jammu and Kashmir, a newly constituted Union Territory (until October 31, 2019, a state). A law was enacted in August 2019 to demote Jammu and Kashmir to union territory and create Ladakh as a separate union territory. Jammu and Kashmir, one of India's largest princely states, is bordered by the Indian Union Territory of Ladakh to the east, Himachal Pradesh and Punjab to the south, Pakistan to the southwest, and the Pakistani-administered Kashmir to the northwest. State belongs to western Himalayan Zone. It has steep, mountainous, and undulating terrain at 1,850–3,048 meters above sea level. Jammu and Kashmir covers 42,241 sq.kms, or 16,309 sq. miles (en.m.wikipedia.org). The Union Territory of Jammu and Kashmir covers 42,241 sq. km between 33° 23' 04.62" to 34° 12' 27.18" N latitude and 74° 15' 43.32" to 75° 02' 01.32" E longitude. Jammu and Kashmir is a unique political place in India because it is a Union Territory and a meeting point for world powers. The temperature in Jammu and Kashmir changes seasonally.

People in Jammu and Kashmir use numerous methods to make a living amid a changing landscape. Agriculture and related sectors are crucial to Union Territory, Jammu and Kashmir's socioeconomic growth. Wheat and paddy are the other two major crops, but agriculture supports 75% of the people. Goat and sheep farming sustain nomadic people. Rainwater is the predominant irrigation source, followed by spring and canal irrigation. Jammu has tropical temperatures whereas the valley has temperate climate. The region receives the most rainfall, 1028 mm, between July and August (IMD, 2014). The Kashmir valley is earthquake-prone. Large and little earthquakes will continue as they have in the past. When, where, and how intense an earthquake may occur is impossible to forecast (UNESCO and UNDP, 2007). Kashmir is earthquake-prone due to its location between the Pir-Panjal and Zaskar thrusts in the north-western Himalayas (IND, 2012). Kashmir valley is located in the western Himalayan mountain range on the

site of a prehistoric lake produced by mountain uplift that silted in and became fertile through alluvium. The valley's agricultural output and seismic susceptibility result from this. In the Union Territory of Jammu and Kashmir, young folded mountains crumple rock strata, causing earthquakes of different strength and magnitude (Hussain, M. 2000). The data collection approach relies on secondary sources. This article addresses general goals including understanding Jammu and Kashmir's natural catastrophe risk. State capitals Jammu and Srinagar are in national seismic zones IV and V. To study how floods, earthquakes, landslides, and avalanches affect Jammu & Kashmir's economy. To make some practical proposals to reduce the economic impact of natural disasters on Jammu & Kashmir. To examine that the theoretical as well as empirical studies of the long-term impact of natural disasters will differ according to the type of disaster, its frequency, the contribution of international aid and the socio-economic conditions of the country. To understand the link between natural disasters and vulnerability needs more attention, especially in those areas where population pressure is high, land degradation and desertification are increasing rapidly. To design further research on how the national and regional funding mechanisms be expanded and how the inherent moral hazard and covariance could be reduced. To know more about climate change and adaptation where the focus is largely on technical issues but less attention has gone to the economic costs and benefits of different adaptation mechanisms. To learn more about natural disasters on a permanent and comprehensive basis will be a key for better understanding of adaptation to climate change. To frame such policies and strategies on socioeconomic development that will build disaster risk mitigation more visible through the national plans.

Floods and avalanches affect socioeconomic development.

Valley of Kashmir is bowl-shaped. Its varied altitude and relief render low-lying areas prone to flooding. The two major urban centres of Jammu and Srinagar, where lakes and ponds act as natural sponges, have suffered significant flooding. Cloudbursts and dam failures cause flash floods, which are deadly and sudden. Floods cause high-velocity water currents that suppress downstream areas within minutes or hours. These floods do massive damage in high slope locations. Human activities like deforestation and improper road



development can cause landslides that increase flash floods. Floods result from rainfall, snowmelt, and other natural events that submerge land. Deforestation, rapid and unplanned urbanization, unstudied bridge and dam construction, and shifting vegetation patterns further increase flood risk. Floods are common in Jammu and Kashmir because large rivers including Jhelum, Chenab, and Indus flow through its populous areas. Heavy rainfall caused one of the worst Kashmir valley floods in September 2014. Due to extreme severe rainfall, the Jhelum, Chenab, and Tawi basins overflowed their embankments in just a few days, 2-6 times the average September rainfall (SDMP, 2017). Continuous rainfall from 1–6 September 2014 caused catastrophic flooding in Jammu and much of Kashmir. Jhelum, Chenab, Sindh, and Lidder basins and tributaries flowed above danger line. The Srinagar river Jhelum, 4.40 feet above the danger line, started rushing above embankments and inundated hospitals, schools, residential buildings, and other infrastructure. The sediment-laden flash flood water took down bridges in low-lying Kashmir, including Awantipora, Srinagar, Bemina, Sonawari, and Qammarwari. The flash flood in Jammu washed away 400 residential dwellings, landslides caused by heavy rainfall obstructed all lines of transit and communication, including roads, railways, mobile service access, and airplanes (Narain, S.2014).). Flash floods in 2014 destroyed crops, agricultural land, and thousands of animals (Shah, Khwaja, Shah, et al., 2018). Landslides damaged buildings, roads, and bridges. A huge landslide in Rajouri drowned away 50 bus passengers. Jammu–Srinagar national highway remains blocked, disrupting rescue efforts (Gupta, 2014). The flood destroyed around 80,000 pucca and 21,000 kachha dwellings. Over 300 people died and millions were displaced. Floods closed four of five Kashmiri hospitals . The elderly, disabled, and those with chronic conditions like diabetes and cancer were harmed by the lack of medical facilities. The abrupt power outage and damaged equipment at GB Pant hospital in Srinagar killed 20 newborns. Education was greatly affected. Many government and private school buildings collapsed in Jammu & Kashmir, leaving thousands of pupils without necessary infrastructure (Venugopal and Yasir, 2017). Food security was a priority for the current government after the floods. According to Sphere India (2014), 36% of Jammu respondents and 86% of Kashmir valley respondents observed a progressive drop in food intake. The flash flood has long-term socio-

economic effects on Jammu and Kashmiris. The people of Jammu and Kashmir lost their homes, livelihoods, and animals. Jammu & Kashmir lost \$15 billion by 2017 according to the Federation of Chambers of Commerce (Tabish and Nabil, 2015). The damage in Jammu and Kashmir exacerbated mental health issues. A study six months after the 2014 Kashmir flash flood found 60% of the population had acute PTSD. The study found that elders and women were more affected by depression and PTSD after floods (Fatima and Maqbool, 2017). Avalanches are common due to the Himalayas. Avalanche is the flow of snow down a mountain slope due to significant snowfall caused by climate change. One of the worst avalanches in 1995 killed 150 people and closed Jawahar Tunnel on the Jammu-Srinagar national route (Hassan, 2014). As they are stationed in hostile areas, avalanches have killed Indian soldiers. Ice, trees, mud, and rocks might fall with the avalanche, destroying lives and property. In 2017, an avalanche in Gurez area killed 20 army troops and four civilians and threatened a tourist site. Avalanches also block roads, cause shortages of essential goods, paralyze communities in high mountain areas of Jammu and Kashmir, and hurt tourism and agriculture by eroding soil. Avalanches are most common in Kashmir, Gurez, Kargil, and Ladakh. Since avalanches happen quickly, they're hard to predict.

Earthquakes' Impact on Socioeconomic Development

Jammu and Kashmir, in the Himalayas, is in India's most seismically active zones, zones IV and V. It has been struck by multiple earthquakes. Since 1505, earthquakes have struck this area. People face serious hurdles from Himalayan and Kashmir earthquakes. Jammu and Kashmir saw 170 earthquakes between 1889 and 1990 (Hassan, 2014). Earthquakes in this region are rising, which is concerning. The valley was devastated by 1555, 1885, and 2005 earthquakes. Earthquakes are unavoidable, but mitigation can reduce their impact on people and the environment. A devastating earthquake hit Jammu and Kashmir in 1555, but its magnitude and location are unknown. Another destructive earthquake hit in 1885, affecting Srinagar, Gilgit, and Shimla in Himachal Pradesh. One million square feet were affected including Baramulla and Pattan (Lawrence, 1895). Many villages were devastated and over 3,000 people died. Kashmir has experienced deadly earthquakes for ages (Ghaffar and Abbas, 2010). In



2005, a 7.6-magnitude earthquake rocked the India-Pakistan border, affecting both nations. The most destructive earthquake killed over 80,000 Pakistanis, injured 100,000, and left 6300 Indians with significant injuries, causing a humanitarian disaster. It was the worst Himalayan earthquake ever (Anees and Bhat, 2016). Residential structures suffered substantial damage, 121 collapsed, 25% of which were in Uri and Poonch towns, bridges collapsed, and highways were blocked. The collapsed houses rendered entire families homeless (Kumar et al. 2006). Frequent earthquakes produce immediate destruction and long-term socio-economic damage. Earthquakes damaged hospitals and government buildings, disrupting health and other vital services. The terrible earthquakes also affected Jammu and Kashmir women. As family caregivers, the women felt insecure and stressed due to a lack of hygiene and food. The lack of medical and reproductive facilities hurt pregnant women.

LANDSLIDES AND SOCIO-ECONOMIC DEVELOPMENT

Landslides are widespread in Jammu and Kashmir. Young mountain ranges with unstable rock bases are here. Disruptions to the slope cause trash, mud, and rocks to flow. Earthquakes, cloudbursts, and severe rain can cause landslides. Deforestation, overgrazing, road construction, dam building, and other human activities have exacerbated vulnerability (Singh, Bhat, Sharma, et al., 2012). Floods and other discrete climatic phenomena that could restrict roads are subject to the vulnerability shadow and economic impact. Landslides and floods are more frequent due to climate change. The economic impact of a landslide and its vulnerability shadow can be divided into three categories: direct economic impact, direct consequential economic impact, and indirect consequential economic impact. Jammu & Kashmir's most landslide-prone areas include Bandipora, Anantnag, Pulwama, Shopian, Doda, and Kishtwar. A landslide from the hills damaged residences, hospitals, bridges, highways, farms, and other infrastructure. Hospital disruptions and sanitation issues harmed public health. Unplanned road and dam building causes most landslides (Singh et al. 2012). Landslides in Kashmir cause fuel and vegetable shortages, raising prices. Landslides have also disrupted religious and cultural events like the Amarnath yatra. The lifestyles of hilly farmers and nomadic groups are also affected. Landslides cover more territory and

prohibit nomadic groups from grazing their animals, affecting their transhumance ship (Anees and Bhat, 2016). A 2009 landslide on the Batote-Doda road along National Highway 1B was caused by slope failure from the Baglihar hydropower plant. The devastating landslide washed away 150 m of highway, killed one person, and damaged 600,000 people's livelihood and food security for a month (Singh, Bhat, Sharma, et al., 2012). Mining in landslide-prone areas endangers the ecosystem and creates a vicious cycle. Landslides obstruct highways and roads, disrupting regional life. Every year, landslides obstruct the Jammu-Srinagar highway, the lifeline of Kashmir valley, stranding hundreds of vehicles.

Climate change effectson socio-economic development

The mountainous geography of Jammu and Kashmir supports an economy that relies on water towers for hydroelectricity, agriculture, water supply, horticulture, and tourism. The Union Territory J&K is rich in biological, sociocultural, and ecological diversity. Jammu & Kashmir's mountains are its pride and necessity. The region's economy relies on natural resources and climate. The region's climate change concerns include floods, landslides, human health, biodiversity, droughts, endangered species, food security, agriculture, and livelihood. Global climate change may cause temperature rise, floods, wildfires, intense rainfall, snowstorms, windstorms, hailstorms, landslides, floods, and diseases. Climate change threatens regional agriculture and horticulture. It impacts regional water resources, ecosystems, forests, tourism, species variety, wildlife, and livelihood. Temperature, precipitation, humidity, and cold waves affect agriculture. Reduced rainfall hurt rain-fed agriculture most. Due to less snowfall, horticultural crops produce less. Human health is affected by climate change. It also affects global forest vegetation patterns, distribution, structure, and ecology. Recent years have seen Anantnag, Pulwama, Kulgam, Shopian, Baramulla, Bandipora, and Budgam convert more paddy land into rain-fed or dry land. According to Climate Change (2014), apple farming has increased while production per hectare has decreased. Climate change will affect the hydrological cycle through evapotranspiration, fresh water shortages, and snow cover loss. Climate change (INCCA) is crucial to regional tourism. Sustainable development in the face of climate change requires

a balance between sustainable economy and sustainable environment by creating sustainable livelihoods. Table 1 shows natural disaster-related deaths.

Table 1: Analysis of Natural Disasters and their impact on human life

Year	Earthquake		Flood		Avalanche		Landslide		Total	
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
1985	3000	—	—	—	—	—	—	—	3000	—
1995	—	—	—	—	150	—	—	—	150	—
2005	80000	106300	—	—	—	—	—	—	80000	106300
2014	—	—	320	—	—	—	50	—	370	—
2017	—	—	—	—	20	—	—	—	20	—
Total	110000	106300	320	—	170	—	50	—	110540	106300

Table 1 shows that earthquakes killed 110000 Jammu and Kashmir residents from 1885 to 2017. The figure includes Pakistan-occupied Kashmir deaths. Disaster earthquakes in Pakistan-occupied Kashmir and Indian-occupied Kashmir harmed 106300 people in recent decades. The 2014 flash flood killed 320 people, according to the table. There were 170 avalanche deaths and 50 landslide deaths. In 2005, 80000 people died and 106300 were injured in the worst earthquake.

Disaster resilience measures by government and non-government agencies

Following natural catastrophes, government and non-government organisations developed strategies to address the vulnerability of individuals and groups to social-economic situations. After the 2014 flood, Kashmiri student organizations from Delhi and other parts of India helped people cope with natural disasters. The national government has additionally sanctioned \$720 million in several packages to Jammu and Kashmir for relief and rehabilitation of 2014 flash flood victims. After an avalanche in 2018, the State Disaster Relief Fund gave \$5715 to the families of the dead and \$172 to the injured. The central government has linked Disaster Risk Reduction to MGNREGA and Indira AwasYojana to help

disadvantaged groups. The central government launched MGNREGA to produce jobs in water harvesting, flood control in water-logged areas, irrigation canal management, tree planting, and traditional water body rehabilitation. The government and nongovernment organizations have started self-help groups for women to empower them to generate micro-credit schemes,

self-employment activities like carpet weaving, goat and sheep rearing, and other activities to boost the region's socio-economic development and disaster resilience. The Jammu and Kashmir government provides farmers with high-quality seeds, fertilizers, and water management facilities to boost agricultural growth to 4% and boost socioeconomic development.

CONCLUSION

This study covered the effects of natural disaster on Jammu and Kashmir residents. Time is needed to strengthen the effective disaster risk reduction and management system, enhance the early warning system by nodal agencies like the Indian meteorological department, and strengthen infrastructural facilities like schools, roads, buildings, and bridges. Infrastructure should be built according to geological and civil engineering criteria to minimize damage from floods and earthquakes. The report recommends a local train group to rescue catastrophe victims, offer first aid by understanding evacuation routes, and communicate for relief before outside help arrives. The study emphasize the need to mitigate demographic vulnerabilities through community development programs for socioeconomic development. To protect residents, the government should create a disaster cycle of preparedness,



response, reconstruction, and mitigation. The government should develop sustainable measures to strengthen communities by considering natural

catastrophe threats. In-depth research is recommended to guarantee regional natural catastrophe resilience measures are addressed.

REFERENCES

1. Anees, S.U., and Bhat, M.S. (2016). History of Natural Disasters in Kashmir Valley, Jammu and Kashmir with Special Reference to Earthquakes. *International Journal of Innovative Research in Science, Engineering and Technology*, 5(9):17163-71.
2. Chhibber, A. and Laajaj, R. (2008). Natural Disasters and Economic Development Impact, Response and Preparedness. 5-7.
3. Fatima, Z., and Maqbool, S. (2017). Prevalence of Post-traumatic Stress Disorder and Depression among Flood Affected Individuals of Kashmir after Six Months of Flood. *International Journal of Applied Research*, 3(6):184-8.
4. Galbraith, R. M., Price, D. J. and Shackman, L. (Eds.). (2005). Scottish road network climate change study, 100p. Scottish Executive, Edinburgh.
5. Ganju, A. and Dimri, A. P. (2004). Prevention and Mitigation of Avalanche Disasters in Western Himalayan Region. *Natural Hazards*, 31(2):357-71.
6. Ghaffar, A. and Abbas, S. F. (2010). "An Overview of Past History Based on Seismicity Pattern of Kashmir Region, An Interpretation from 2005 Earthquake", *The Journal of Animal and Plant Sciences*, 20 (4): 297-304.
7. GoJ&K. (2015). Schemes of the Rehabilitation Council. Kashmir: Social Welfare Department, Government of Jammu and Kashmir.
8. Gupta, A .K. (2014). Loss of Life in Kashmir: A Tale of Man Made Disaster. New Delhi: The Water Digest Report. P8-25.
9. Hassan, R. (2014). Disasters in Kashmir: Impact and Response. *Journal of Humanities and Social Science*, 19(7):32-42. <https://en.m.wikipedia.org> <https://www.britannica.com> <https://www.dailyexcelsior.com> Indian Express. (2018). Landslide Blocks Jammu-Srinagar Highway. Noida: Indian Express.
10. Irshad, I. A. and Bhat, A. A. (2015). The Vitality and Role of Self-help Groups (SHGs) in Women Upliftment: Special Reference to Kashmir. *International Journal of Research Granthaalayah*, 3(8):105-110.
11. Kumar, K. V., Martha, T. R., and Roy, P.S. (2006). Mapping Damage in the Jammu and Kashmir Caused by 8 October 2005 Mw 7.3 Earthquake from the Cartosat-1 and Resourcesat-1 Imagery. *International Journal of Remote Sensing*, 27(20):4449-59.
12. Rafiq, M. and Mishra, A.K. (2018). A Study of Heavy Snowfall in Kashmir, India in January 2017. *Weather*, 73(1):15-7.
13. SDMP. (2017). State Disaster Management Plan. India: Department of Disaster Management, Relief, Rehabilitation and Construction, Government of Jammu and Kashmir.
14. Shah, A. A., Khwaja, S., Shah, B. A., Reduan, Q. and Jawi, Z. (2018). Living with Earthquake and Flood Hazards in Jammu and Kashmir, NW Himalaya. *Frontiers in Earth Science*, 6:179.
15. Sharma, R., Sharma, V.K. and Waris, V.S. (2012). Impact of Peace and Disturbances on Tourism and Horticulture in Jammu and Kashmir. *International Journal of Scientific and Research Publications*, 2(6):1-7.
16. Singh, Y., Bhat, G.M., Sharma, V., Pandita, S.K., and Thakur, K.K. (2012). Reservoir Induced Landslide at Assar, Jammu and Kashmir: A Case Study. *Journal of the Geological Society of India*, 80(3):435-9.
17. Venugopal, R., and Yasir, S. (2017). The Politics of Natural Disasters in Protracted Conflict: The 2014 Flood in Kashmir. *Oxford Development Studies*, 45(4):424-42.
18. Vithalani, K. R., and Bansal, N. (2017). Causes and Effect of Kashmir Flood. *International Journal of Advance Research, Ideas and Innovations in Technology*, 3(6):863-9.
19. Winter, M. G. and Bromhead, E. N. (2012). Landslide risk: some issues that determine societal acceptance. *Natural Hazards*, 62, 169-187. 43.
20. Yadav, K., Choudhry, P., and Deepak, A. (2016). Know your state Jammu and Kashmir. Arihant Publication, Meerut India. p35.